U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-219/92-15

Docket No. 50-219

License No. DPR-16

Licensee: GPU Nuclear Corporation
P. O. Box 388
Forked River, New Jersey 08731

Facility: Oyster Creek Nuclear Generating Station

Inspection At: Forked River, New Jersey

Inspection Conducted: July 20 to 24, 1992

Inspector: David J. Chawaga, Radiation Specialist — Date: 8-13-92

Approved by: W. Pasciak, Chief, Facilities
Radiation Protection Section, DRSS — Date: 8-13-92

Areas Inspected: The inspector conducted an unannounced review of radiological safety at the licensee's facility while the reactor was in full power operation. Areas inspected included: previous NRC items, implementation of field controls such as postings, barricades and barriers, Radiological Incident Reports (RIRs), shielding, ALARA planning, and a BWR ALARA comparison study performed by GPU personnel.

Results: Within the scope of this inspection no violations were identified. Good performance was noted in the ALARA planning area. Four open items were closed in this report.

DETAILS

1.0 Personnel Contacted

1.1 Licensee Personnel

J. Barton, Director, Oyster Creek
* W. Cooper, Manager, Radiological Engineering
* B. DeMerchant, Senior Licensing Engineer
J. Derby, Radiological Engineer, ALARA
S. Hopson, Radiological Engineer
A. Judson, Radiological Engineer
* S. Levin, Director, Operations and Maintenance
D. Reppert, Radiological Engineer
* M. Slobodien, Radiological Controls Director
* C. Pollard, Radiological Field Operations Manager
T. Eagan, Sr. Radiological Controls Technician
B. Doucette, Radiological Controls Technician

1.2 NRC Personnel

J. Nakoski, Resident Inspector
* D. Vito, Senior Resident Inspector

* Denotes attendance at the exit meeting on July 24, 1992.

2.0 Purpose

The purpose of this unannounced inspection at the licensee's facility was to review previous NRC items, implementation of field controls such as postings, barricades and barriers, Radiological Incident Reports (RIRs), shielding, ALARA planning, and a BWR ALARA comparison study performed by GPU personnel.

3.0 Status of Previous Items

3.1 Closed, Violation (50-219/91-12-01). The licensee discovered an unauthorized use of shielding by a contract Radiological Controls Technician (RCT) while investigating another issue in the valve nest area located on the 51' elevation of the Reactor Building. Four (1 X 2 foot) lead wool blankets were placed on a six inch diameter Reactor Water Clean-up (RWCU) pipe which contained a hotspot that, while unshielded, resulted in a the dose rate at 12 inches from the piping to exceed the TS locked access control limit of 1,000 mrem/hour.

The shielding was applied prior to performing a pipe stress analysis and had not been approved in accordance with the method described in Station Procedure 9300-ADM-3282.01, "Use of Permanent and Temporary Shielding". Calculations later showed that the weight of the shielding (88 pounds) was far less than the allowable load limit for that piping.

The individual who applied the shielding was counseled and all RCTs were reminded of the station's policy which clearly stated in 9300-ADM-3282.10 that, "Unauthorized use or storage of shielding in the Radiologically Controlled Area (RCA) is prohibited". The inspector discussed the station's temporary shielding policies with a sampling of RCTs. All RCTs interviewed clearly understood the need to obtain authorization prior to installation of shielding on plant systems. In addition, the contractor RCT training course was modified to emphasize station requirements in this area. The inspector determined that program controls, if properly implemented, would assure the proper use of shielding material. After a review of records and discussions with personnel, the inspector found no indication of program weakness that would prevent closure of this item.

This item is closed.

3.2 Closed, Violation (50-219/91-16-01). During an inspection conducted on May 1-2, 1991, the inspectors identified a violation of 10 CFR 19.12 which requires that, individuals working in any portion of the RCA shall be kept informed of the radiation in such portions of the restricted area, and shall be instructed in precautions and procedures to minimize exposure.

On April 26 1991, a licensed operator entered the RWCU Filter Sludge Tank (FST) room (a restricted area with contact exposure rates as high as 75 R/hour) without knowing the radiation levels in that area. The operator was expected to work in the Locked High Radiation Area (LHRA) hallway outside of the FST room and was not expected to enter the room. However, there was no physical barrier which separated the LHRA hallway from the FST room and the RCT covering the job could not directly observe the work area and subsequently could not provide positive control over the operator's actions. The operators were not given clear instructions absolutely prohibited them from entering the FST room.

"Exclusion Area" is the licensee's term which describes an area with extremely high radiation dose rates. The TIP room and the FST room were the only "Exclusion Areas" at the plant. The operator made the entry to the FST on a Standing Radiation Work Permit (RWP) for "Routine Plant Operations". Standing RWPs are typically used for general entry to the RCA and do not provide enough guidance to personnel in areas such as "Exclusion Areas".

As a result of this incident, a Procedure Change Notice was written for 9300-ADM-4110.06, "Control of Locked High Radiation Areas" which specified that all entries to Exclusion Areas require a Job Specific RWP. The Job Specific RWP would detail briefing requirements for such areas. Face to face briefings between workers and the GRCS is now required prior to entering an Exclusion Area. The workers involved in this incident were counseled and information regarding proper Exclusion Area entry was provided to all Radiological Controls (Radcon) and Operations personnel. Section 3.3 of this report contains related corrective actions for this incident.

This item is closed.

3.3 Closed, Violation (50-219/91-16-02). During the RWCU incident described in Section 3.2 of this report, the licensee failed to monitor the licensed operator on entry to the RWCU FST room in accordance with Technical Specification (TS) 6.13. TS 6.13 requires, in part, that an individual or group of individuals entering a posted Locked High Radiation Area be provided with either an alarming dose rate meter, survey meter, or be under the direct observation of a health physics qualified individual with a radiation dose rate instrument who is responsible for providing positive control over activities in the area.

The two operators were originally working together in the hallway outside of the FST room and one of these operators was wearing an alarming dosimeter. However, the operators separated and the operator who entered the FST room did not wear the alarming dosimeter. In addition, neither operator had been made knowledgeable of dose rates in the FST room. The RCT covering the job was not in close proximity to the work location and could not provide positive control over the entry to the FST room. In fact, the RCT was not aware of the entry until after it had occurred.

The licensee temporarily suspended entries to the FST room pending analysis of this event. Survey results were combined with the results of a time and motion study to help reconstruct the exposure incident to determine appropriate dose assignments. Access to the RCA was suspended for the two operators involved in the incident until a detailed investigation of the event could be completed.

An inner gate was installed to separate the FST room from the hallway. This gate was installed to prevent unauthorized entry to the FST room by individuals authorized to work in the hallway and, the following monitoring and job coverage provisions are now required for entry to Exclusion Areas: 1) at least two persons are now required for each Exclusion Area entry and one of those persons must be a RCT; 2) each person must wear an alarming dosimeter in addition to other monitoring equipment; and, 3) members must be in line of sight or be in radio contact during the entry. Other related corrective actions are listed in Section 3.2 of this report.

This item is closed.

3.4 Closed, Violation (50-219/91-20-03). This item involved a June 24, 1991 shipment of radioactive material which was made to an offsite vendor. The shipment was made without listing asbestos, a hazardous substance contained in the shipment, on the shipping papers.

With completion of Revision Number 14 to Station Procedure 351.22, "Radioactive Waste Handling Procedure," the licensee completed the corrective actions specified in their response letter to NRC regarding this issue (C321-91-2279 dated October 11, 1991). The revised procedure requires the use of specially marked bags for the handling contaminated asbestos. These bags clearly indicate the presence of asbestos.

This item is closed.

4.0 Observations During Plant Tours

General housekeeping within the plant was well maintained. Items were stored clear of areas where they might obscure radiological postings or challenge contaminated area boundaries. Radiological postings were observed to be clear, concise and in accordance with station procedures. All LHRAs visited were secured in accordance with TS requirements. Contaminated areas were reduced in size which allowed most areas of the plant to be toured without protective clothing. RCTs interviewed during plant tours were well versed in the plant's radiological conditions and knowledgeable of work in progress. All work observed within the Radiologically Controlled Area (RCA) was progressing safely. No concerns were noted during direct observation of field activities.

5.0 Radiological Incident Reports (RIRs)

The inspector's review of recent RIR records indicated that all events recorded were properly handled by the licensee. As a courtesy, Radcon personnel typically notified the NRC resident inspectors of occurrences which were below the required reporting threshold. The discovery of sightly contaminated tools and materials outside of the RCA (within the plants protected area boundary) was the most prevalent occurrence observed in the RIRs. Other incidents involved either poor radiation worker practices, spills, or small unplanned intakes of radioactive materials. Worker intake of radioactive material was far below regulatory limits in all cases reviewed. Each RIR was individually reviewed by the inspector with the assistance of the Radiological Engineer who was responsible for the RIR program. According to records, all RIR events were well handled by licensee personnel and fell within the framework of the NRC's regulatory requirements.

6.0 Shielding Packages

The inspector reviewed the paperwork for all temporary shielding installed from early 1991 to present. Station Procedure Number 9300-ADM-3282.01, "Use of Permanent and Temporary Shielding", states that, "Radiological Engineering shall perform a Post-job Shielding Evaluation using Form 9300-ADM-3282.01-5, for all job-specific temporary shielding, unless authorized by the Radiological Engineering Manager". This form had not been completed for some packages which were installed and removed over six months ago. The inspector discussed this issue with licensee representatives and concluded that an unusually high attrition rate contributed to the less than timely completion of the forms.

The Post Shielding Evaluation Form serves as the only formal measure of overall shielding effectiveness and was considered to be an important element of the procedure. However, the major value of this form is not recognized until a shielding application is to be repeated. The information required for completion of these forms was contained in other licensee records. According to licensee personnel, if there had been a need to repeat a shielding application, the form would have been completed as required.

The inspector considered the delayed completion of the form to be a poor practice. Licensee personnel informed the inspector that their intent was to complete the forms in a more timely manner and immediately implemented appropriate corrective actions. This item will be reviewed during a future inspection.

7.0 ALARA Program Planning

Plant work may be divided into three categories. These categories include modifications, corrective maintenance and preventative maintenance.

Modifications are proposed, approved, funded, engineered and implemented over a relatively long period of time and are closely followed by a Radiological Engineer.

Corrective maintenance consists of both planned and emergent corrective maintenance items. Planned maintenance accounts for the majority of exposure at Oyster Creek. Radiological Engineering has the opportunity to add radiological safety steps to planned maintenance procedures over an extended period of time. Emergent work usually does not involve a long or formal ALARA planning process and Radcon success typically depends on an effective RWP prepianning meeting and active participation in job site planning.

Preventative maintenance (PM) items include surveillance and inspections. Task and Radiation Work Packages (RWP) packages are maintained for repetitive PM jobs. When a PM item appears on the schedule, the ALARA group will typically review these packages to ensure that historically implemented controls are commensurate with present conditions.

Recent improvements in ALARA planning have enabling the Radcon group to better anticipate and support all types of work during the operating cycle and in the event of a planned or unplanned shutdown. The ALARA group, rather than Radcon Field Operations, plans and completes all RWPs packages (except those created on short notice to support emergent backshift work).

The ALARA group prepares RWP packages in anticipation of ready-to-work packages which have been placed in the plant's computerized Job Order List by maintenance. These packages are separated into those which will be worked during the current operating cycle, scheduled refueling outage and unplanned shutdown. In the past, delays for Radcon personnel to developed these packages were considerable. Preparing packages in advance has significantly reduced such delays.

The Radcon RWP packages contain survey plans, coverage plans and recovery plans and include a draft RWP. When work is scheduled, the corresponding survey plan is pulled, reviewed and made available to the RCT staff. The survey plan contains blank survey maps and marked-up floor plans which show the RCT where work will be performed. Prior to initiating an area or job specific survey, the RCT may review historical and current data regarding task specifics, worker body orientation, dose stratification profiles, power level and hydrogen injection dose rate dependence, type of radiation anticipated, air sampling considerations, hotspot data and special instructions.

The Radcon Field Operations Group sorts survey plans by area and develops a master survey plan. The master survey plan combines survey efforts and is expected to result in lower doses to the surveying technicians and better targeted job support surveys. Improved planning was expected to result in better allocation of other resources such as containments, shielding, ventilation, decontamination and waste management equipment and services. Special needs such as these, if not addressed in the planning phase, can not be easily supported by the Radcon Field Operations group at the last moment. Licensee personnel expect that better planning will result in improved management of radiological safety in the field.

8.0 Cumulative Exposure at Oyster Creek

The licensee completed a study of differences between 36 other BWRs and Oyster Creek in an attempt to identify the reasons for the station's relatively high cumulative radiation exposure totals. There are many confounding factors which must be considered in such an effort. Plant age, containment type, reactor design, plant capacity, and engineering, construction and operating account for some of the major differences between facilities. Although these variables are complex, interrelated and difficult to quantify, licensee personnel concluded that some specific design items clearly hinder radiological control efforts at Oyster Creek beyond what might typically be found at other BWR facilities.

Many of these differences significantly contribute to occupational exposure totals for drywell work. Work in the Drywell constitutes approximately two thirds of the station's total exposure. Some of the design problems noted which contributed to higher exposure included the following:

- o Oyster Creek has only 3 elevations within the drywell where other BWRs typically have 4 or 5 elevations. Having more fixed elevations would provide rapid access to components and decrease the need for scaffolding construction.

- o Oyster Creek's Drywell Equipment Drain Tank (DWEDT) is located on the lowest elevation of the drywell where it is poorly shielded compared to other designs where the DWEDT is located below the subpile room floor.

- o Oyster Creek has a single hatch for drywell access. Later designs included separate equipment, personnel and CRD removal hatches. Having more hatches allows for separation of radiation work and would expedite the transfer of material.

- o Oyster Creek has a 5 recirculation loops/pumps as compared to the 2 loops and pumps used in later designs. Major recirculation pipes are positioned at approximately every 36^0 around the drywell versus 90^0 at two loop facilities. The use of 5 loops necessitates the use of 10 major recirculation valves as compared to the 4 or 6 valves found in other designs. In addition, the flow rate in the recirculation piping at Oyster Creek is a suspected contributor to higher dose rates in the drywell.

- o Oyster Creek has 21 main steam safety and relief valves which is more than that installed in other reactor types.

- o Newer drywells contain less equipment (i.e., ventilation units relocated), are larger and better shaped (cylindrical versus inverted light bulb shaped).

The report lists some of the dose saving advantages particular to the Oyster Creek BWR-2 design. However, these are estimated to be small in comparison to the factors listed above. Finally, the report summarizes actions taken and those under consideration which should result in lower occupational exposure at the station.

The inspector reviewed the report and considered an understanding of its content to be an essential part of understanding why radiological difficulties, such as high personnel radiation exposure totals, are seen at Oyster Creek. The inspector considered the licensee's evaluation to be well performed and a worthwhile initiative.

9.0 Exit Meeting

The inspector met with licensee representatives at the end of the inspection, on July 24, 1992. The inspector reviewed the purpose and scope of the inspection and discussed the findings.